(E104)

TOMATO: Lycopersicon esculentum Mill., 'Florida 47'

Silverleaf whitefly: Bemisia argentifolii Bellows & Perring

P.A. Stansly and J.M. Conner

University of Florida/IFAS
Southwest Florida Res. and Ed. Center
2686 State Road 29 North
Immokalee, FL 34142-9515
Phone: (941) 658-3427
Fax: (941) 658-3470
Email: pas@icon.imok.ufl.edu

IMPACT OF INSECTICIDES ON SILVERLEAF WHITEFLY AND TOMATO YELLOW LEAFCURL VIRUS (TYLCV) ON STAKED TOMATO, 1999: TYLCV is a devastating disease of tomato caused by a geminivirus vectored by B. argentifolii and B. tabaci in the Mediterranean and Caribbean regions including Florida. Along with cultural control such as host free periods, insecticidal control of the whitefly vector is the key to managing TYLCV. Greenhouse-raised seedlings were planted 17 Mar at 18-inch spacing on two sets of three beds. The beds were 32 inches wide, 240 ft long on 6-ft centers, covered with black polyethylene film and irrigated through Netafim7 streamline drip-tape with emitters at 12-inch intervals. The beds had been fertilized with 800 lb/acre of 5-16-8 dry bottom mix and fumigated with 300 lb/acre of 67/33% mixture of methyl bromide/chloropicrin. Fertigation provided an additional 175 lb N and 225 lb of K_2O during the growing season. The plants were staked and tied according to standard practices and sprayed with a combination of Maneb 80 WP at 1 lb/acre plus Kocide 101 at 3 lb/acre for disease control. The middle row of each 3-bed set had been planted a month earlier with collards to serve as a source of whiteflies. Each bed of tomato was divided into 5 plots, each 48 ft long and assigned to treatments in a CRB design with four replications. Admire® 2F was applied at a half rate of 8 oz/acre = equivalent to 0.125 lb (AI) on 7 Apr in 10 ml of water per plant for two treatments, one receiving 5 weekly applications of Neemix 4.5% at 4 oz/acre = 0.012 lb (AI) beginning 15 Apr and the other left unsprayed. Actara 25 WG at 0.34 lb/acre = 0.085 lb (AI) and Knack .86 EC at 8.2 oz = 0.055 lb (AI) were also applied on 15 Apr. On 14 May, plots that had been sprayed with Knack were sprayed with Applaud 70 WP at 0.5 lb/acre = 0.35 lb (AI). Applications were made using a high clearance sprayer driven by a hydraulic pump operating at 200 psi and delivering the spray through two drop booms equipped with 2 yellow hollow cone ceramic Albuz nozzles each for a rate of 44 gpa. On 29 Apr, another nozzle was added to each drop for an output of 66 gpa for the remaining applications. Five weekly evaluations of whitefly adults were made starting 21 Apr by beating 1 side of 4 plants at 4 locations per plot with a 9 x 13 inch pie pan painted black and coated with a 9:1 mixture of vegetable oil and liquid detergent. Immature stages were monitored from one leaf removed from the 6th node of 6 centrally located plants in each plot. All whitefly stages were counted in a 2 cm^2 ring placed on 3 leaflets of each of the 6 leaves for a total surface area of 36 cm^2 per sample. Plants showing symptoms of TYLCV were marked every 3 or 4 days.

All insecticide treatments provided significant levels of adult whitefly control throughout the entire experiment. The lowest numbers of
whiteflies were observed on the plants treated with Admire alone, Admire + Neemix and Actara on 21 Apr, and Admire alone, Admire + Neemix and Knack on 5 and 19 May. Actara applied as a foliar spray only provided comparable control to soil-applied Admire once on 21 Apr. Numbers of eggs and total immatures were generally fewest in the two treatments with Admire. The addition of Neemix sprays did not result in any significant change. Actara was similar to Admire through 6 May but not afterward. On 28 Apr and 6 May, there were actually more eggs observed on the plants treated with Knack than the check. The number of eggs on 12 May was lowest on the plants treated with Admire and Neemix but not significantly less than Admire alone. All treatments on that date had fewer eggs than the check except Knack. However, there were fewest nymphs + pupae with Admire + Neemix, Admire alone and Knack with Actara intermediate between these and the check. Similar results were observed on 20 May. On 28 May, there were statistically as many eggs on the plants treated with Knack/Applaud and Actara as on untreated plants. However, fewest nymphs + pupae were seen on plants treated with the IGRs (Knack and Applaud). Over all dates, fewest eggs were seen on plants treated with Admire and Neemix and there was no difference between the IGRs and the check. Nymphs + pupae grouped both Admire treatments with the IGRs and there was no difference between Actara and the check. The distribution of TYLCV-infected plants was aggregated over the field but did show some treatment effects, especially toward the end of the trial. Over all dates, the lowest percentage of new virus was seen in the plots treated with both Admire and Neemix, although not significantly less than Admire alone. Yields tended to reflect trends in virus distribution although differences were not as pronounced, presumably because treatment effects on TYLCV incidence occurred late. Nevertheless, the number and weight of extra-large and total fruit from plants treated with Admire and sprayed weekly with Neemix were significantly greater than the check but not greater than any other treatment. Thus, the trial

emphasized the value of the early soil application of Admire, followed by foliar applications of different products as necessary.

TABLE 1.

Treatment/Formulation	Rate lb(AI)/acre	No. of whitefly adults from 1 side of 4 plants					
		21 Apr	28 Apr	5 May	12 May	19 May	Mean[a] over dates
Admire 2F + Neemix 4.5 %	0.125 0.012	19.4c	64.8d	28.1c	42.1d	93.8c	49.6b
Admire 2F	0.125	24.4c	72.4d	39.4c	47.1cd	71.8c	51.0b
Knack .86 EC rotated with Applaud 70 WP	0.055 0.35	62.6b	109.4cb	69.8c	154.8bc	79.5c	95.2b
Actara 25 WG	0.085	21.3c	120.1b	127.6b	168.6b	216.5b	130.8b
Untreated check		103.4a	201.9a	213.3a	390.8a	384.4a	258.8a

Means followed by the same letter in a column are not significantly different (LSD, P < 0.05).
[a]Analysis over all dates used rep x treatment as error term.

TABLE 2.

Treatment/ Formulation	Rate lb (AI)/acre	No. of whitefly immatures/2 cm^2 leaf area													
		21 Apr		28 Apr		6 May		12 May		20 May		28 May		Mean over dates[a]	
		Nymphs Eggs+	Pupae	Nymphs Eggs +	Pupae	Nymphs Eggs +	Pupae	Nymphs Eggs +	Pupae	Nymphs Eggs +	Pupae	Nymphs Eggs +	Pupae	Nymphs Eggs +	Pupae
Admire 2F + Neemix 4.5 %	0.125 0.012	0.49c	0.38d	1.81c	1.12c	2.39b	2.03b	1.51c	2.25c	0.81c	3.31b	1.49b	6.16b	1.41c	2.33b
Admire 2F	0.125	0.70c	0.73cd	1.41c	1.12c	3.9b	2.08b	3.22bc	4.63c	0.97c	3.52b	2.17b	8.51b	2.06c	3.13b
Knack .86 EC rotated with Applaud 70 WP	0.055 0.35	1.69b	3.06b	7.31a	3.32b	6.32a	1.57b	7.83a	4.27c	5.03a	2.78b	3.8a	2.11c	5.42a	2.90b
Actara 25 WG	0.085	1.42b	1.32c	1.19c	1.67c	2.89b	2.03b	4.3b	9.14b	2.11b	8.49a	3.98a	15.77a	2.57bc	5.85b
Untreated check		3.94a	4.64a	4.93b	6.71a	2.65b	6.6a	7.87a	19.57a	0.69c	8.79a	3.66a	18.51a	3.97ab	10.35a

Means followed by the same letter in a column are not significantly different (LSD, P < 0.05).
[a]Analysis over all dates used rep x treatment as error term.

TABLE 3.

Treatment/ formulation	Rate lb (AI)/acre	Final[a] TYLCV(%)	Marketable fruit/12 plants (3 harvests)			
			Extra-large		Total marketable	
			No	Wt (lb.)	No	Wt (lb.)
Admire 2F + Neemix 4.5 %	0.125 0.012	19.5c	83.3a	39.90a	229a	74.13a
Admire 2F	0.125	28.8bc	76.5a	35.55ab	204ab	66.45ab
Knack .86 EC rotated with Applaud 70 WP	0.055 0.35	49.2ab	64.5ab	28.88ab	210ab	61.73ab
Actara 25 W	0.085	53.9ab	66.8ab	30.28ab	200ab	62.15ab
Untreated check		61.7a	45.0b	25.28b	176a	55.45a

Means followed by the same letter in a column are not significantly different (LSD, P < 0.05).
[a]Values pertain to final incidence of TYLCV although analysis was done on mean number of plants showing new symptoms of over all observations using rep x treatment as error term.